AE 8801 A Syllabus

Bioastronautics Seminar (Credits: 1), Section A

Fall 2026

Instructor Information

Instructor: Christopher E. Carr

Email: cecarr@gatech.edu

General Course Information

Description

Bioastronautics Seminar surveys the past, present, and future of human spaceflight through the lens of human adaptation to extreme environments, exploring the limits and augmentation of human performance. This course aims to introduce, at the graduate level, critical history, current knowledge, and unknowns related to human exploration of space, including in weightlessness, the moon, and Mars. Topics include key history and literature, quantitative physiology, bioenergetics, manual control, and other areas of relevance as humans venture beyond low Earth orbit.

There are no formal pre-requisites other than graduate status. Relevant background includes thermodynamics, fluid dynamics, physics, dynamics, biology, structures, human factors, and many more areas. The main requirement is a willingness to read, learn, and contribute.

Course Learning Outcomes

- Describe the historical context in which bioastronautics knowledge has been developed.
- Explain the basis for physiological effects of spaceflight on the human body from a conceptual and quantitative manner, utilizing engineering tools to understand human adaptation and performance in space and planetary environments.
- Evaluate and analyze human space systems required to support human activity in space, including intravehicular and extravehicular activity, life support, and environmental control.

- Identify open questions in bioastronautics that are timely and relevant to human exploration and habitation beyond Earth, including on the Moon and Mars.

Required Course Materials

No textbook is required. Course materials have been selected from those available via Georgia Tech's library and/or the public domain, and will be provided to students.

Grading Policy

The grading breakdown is as follows:

Grading Breakdown

- Participation (as measured by surveys and based in part on reading papers and participating in class discussions): 50%
- Individual Assignments (short assignments): 25%
- Mini Project (small group project at end of semester): 25%

Grading Scale: A: 90–100% | B: 80–89% | C: 70–79% | D: 60–69% | F: 0–59%

Description of Graded Components

Participation is measured by surveys and based in part on reading papers and participating in class discussions. There will be several short individual assignments related to course learning. The mini project will be a small group activity completed at the end of the semester. There will be no midterm and no final exam.

Additional Criteria for Successful Completion

Final course grades at Georgia Tech are awarded on a scale of A–F with no +/- grades permitted. Students must earn a passing grade (D or above) to receive credit for the course.

Course Policies

Attendance and/or Participation

This class includes both asynchronous and synchronous activities, including group activities, which are a critical part of the learning process. Active participation is expected and will contribute toward your final grade. Attendance will be verified through post-activity feedback.

More than one unexcused absence during the semester will result in a deduction in your attendance grade. Institute-approved absences will not count against you, and reasonable accommodation will be made for illness and emergencies. See https://catalog.gatech.edu/rules/4/ for more information about institute expectations and restrictions around attendance, including information about excused absences.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code (https://catalog.gatech.edu/policies/honor-code/) and the student Code of Conduct (https://catalog.gatech.edu/rules/18/).

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Core IMPACTS

Not applicable.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (http://disabilityservices.gatech.edu/) at (404) 894-2563 as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations (http://www.catalog.gatech.edu/rules/22/) articulates some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Instructor Prerogatives

The instructor reserves the right to determine and adjust the content, structure, pedagogical approach, instructional methods, assessment

strategies, and course materials for this course, consistent with the instructor’s professional judgment and academic freedom, and in compliance with Georgia Institute of Technology and University System of Georgia policies and principles. This includes the right to modify these elements during the semester as needed to best achieve the stated course learning outcomes and to respond to the evolving needs of the discipline and students enrolled in the course.